small container → gas in → contents out via pipe, apply u/s excitation → gas liberated

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(54) Method and means for dispensing a beverage

(57) Beverage dispensing apparatus and method by which gas in solution in the beverage can be liberated during dispensing to form a head of froth is provided by a compact bar mounted unit in which a bottled beverage 1 is clamped between a plate 8 and a block 9 with the bottle mouth sealed against a seal 13. The beverage is dispensed through a dip tube 23 forming an extension of an outlet passage 21 leading to an outlet spout. Located in the outlet passage 21 is means such as a restrictor or ultrasonic device by which the beverage is excited to liberate the gas and form the head. The beverage is displaced from the bottle 1 by the injection of air under pressure into the headspace of the bottle.

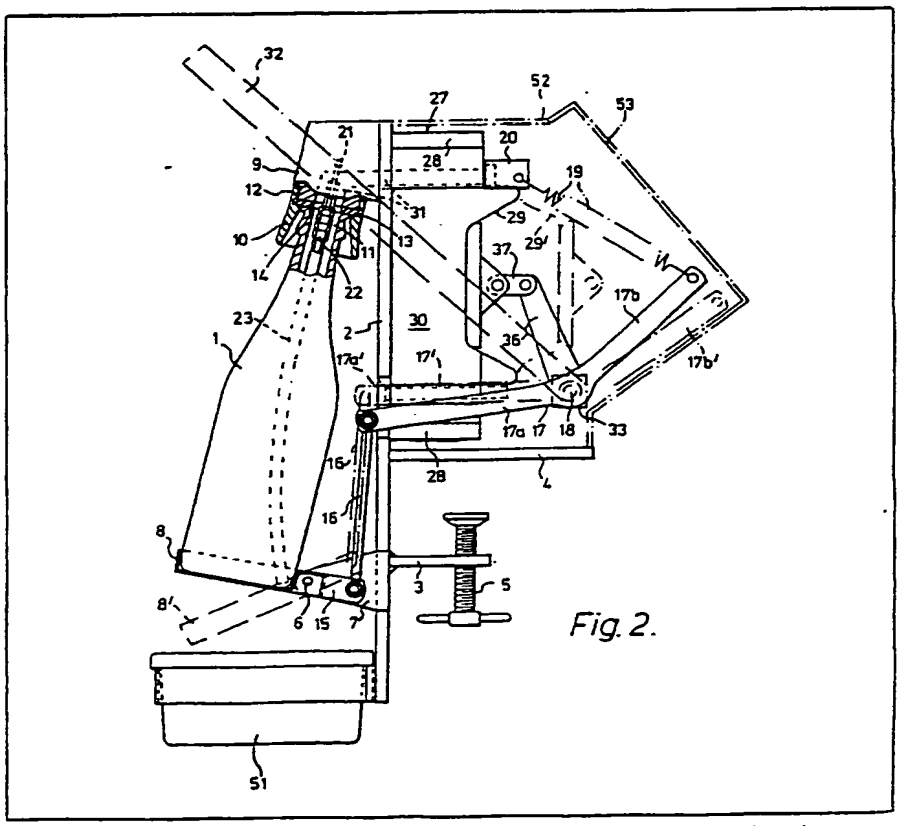

Fig. 2.

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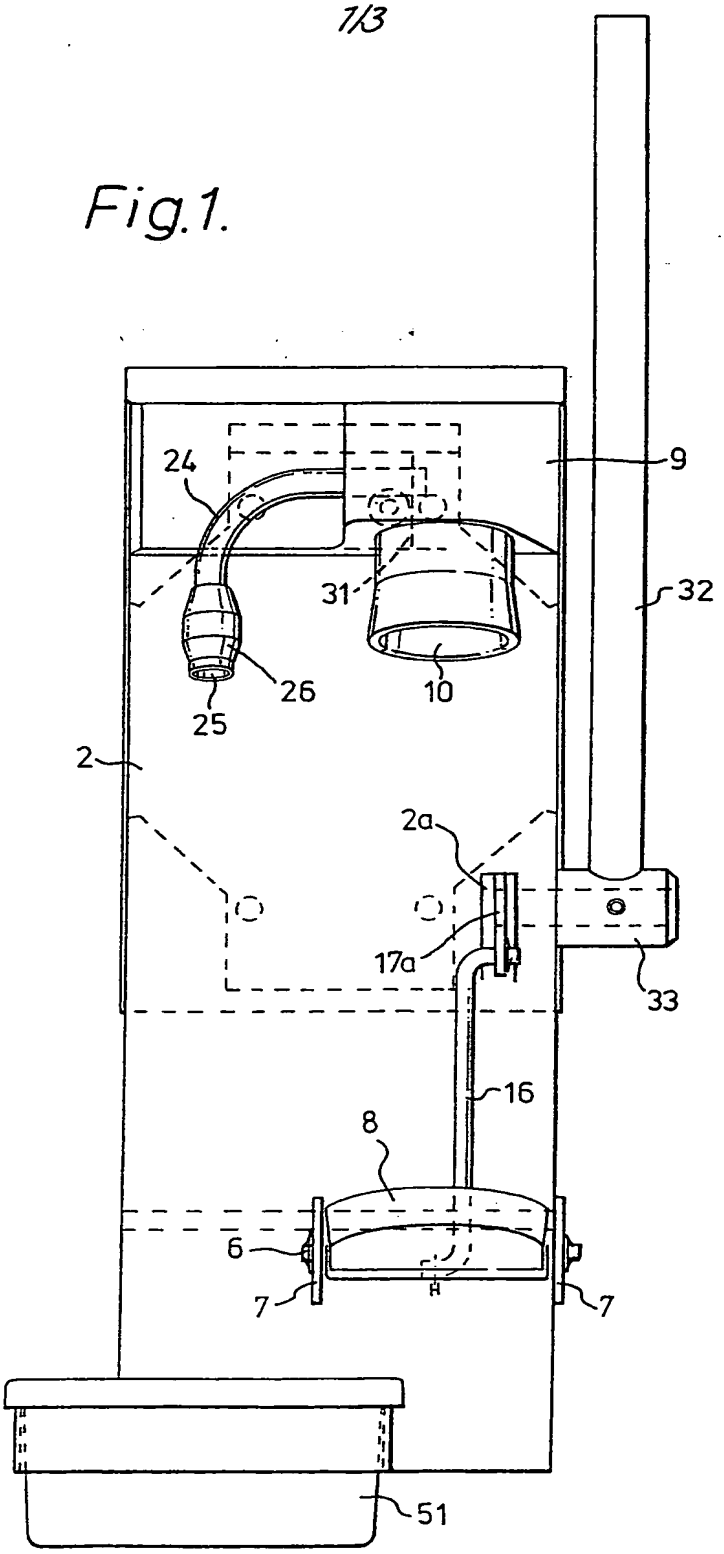
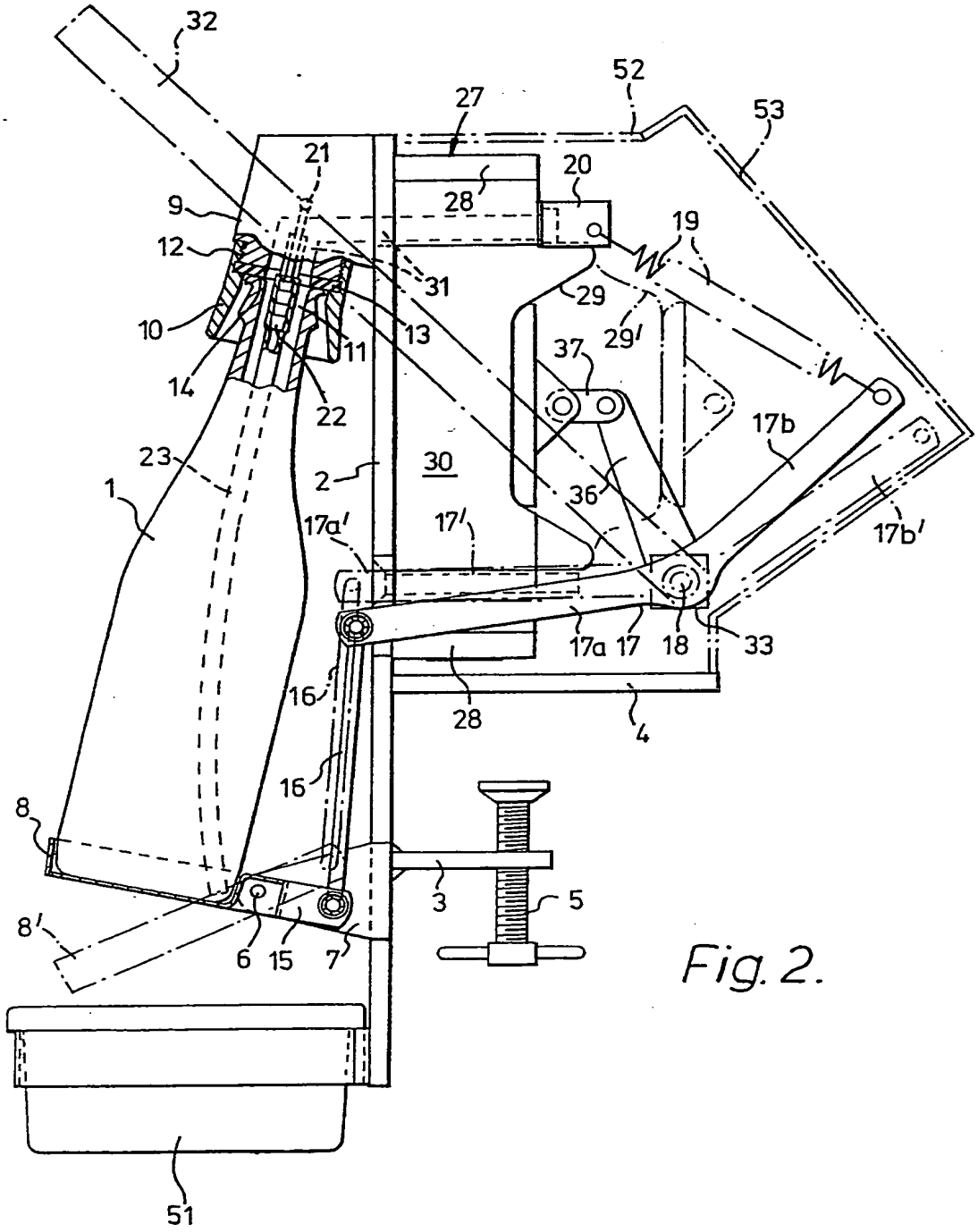
Fig.1.

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52
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53
21
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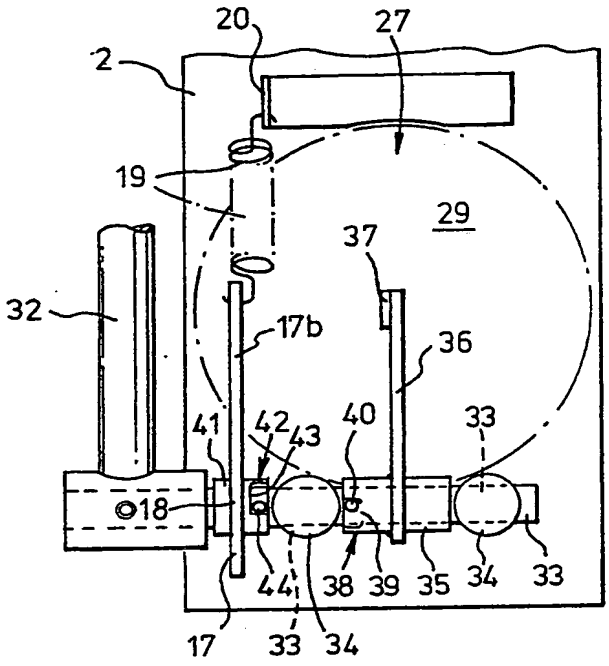
28
9
19
12
31
29
10
13
29'
11
37
14
22
17b
23
30
2
1
36
17a'
17'
17b'
17a
17
18
33
16
28
4
16
8
3
5
8'
6
15
7
51

Fig. 2.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27
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37
32
17b
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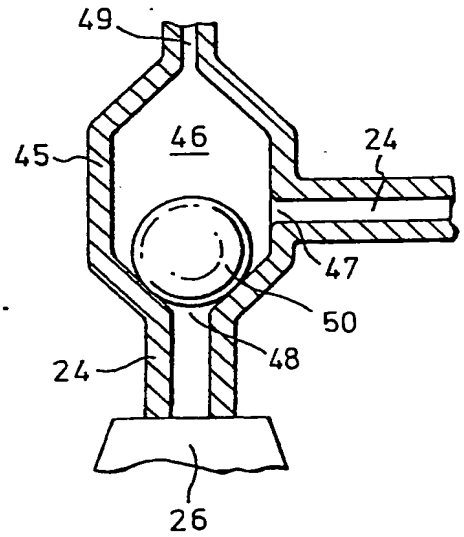
Fig. 3.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46
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Fig. 4.

SPECIFICATION

Method and means for dispensing a beverage

This invention relates to a method and means for dispensing from a container a beverage having gas in solution.

Many beverages of the fermented kind such as beer, ale, lager and stout, and of the non-fermented kind such as the so-called soft drinks, mixers or minerals contain gas in solution and/or are dispensed under gas pressure so that during dispensing the gas is liberated to provide, for example a head of froth, a sparkling or effervescent effect and/or to generally improve the physical and chemical characteristics of the beverage. It is well known to gasify beverages with for example, carbon dioxide which is liberated from solution with the beverage in sufficient quantity during dispensing to provide what may be regarded as acceptable characteristics for some fermented beverages and for the majority of non-fermented beverages. The liberation of such carbon dioxide is readily achieved merely by turbulence of the beverage. For beverages which are gasified, for example with nitrogen, the liberation of the nitrogen is not so readily achieved and is certainly not achieved merely by turbulence as would result from pouring the beverage into a drinking vessel. The use of nitrogen gas in solution and/or for dispensing purposes is particularly desirable, especially for fermented beverages since the head which it forms (possibly with carbon dioxide which may be present) is of a creamy nature, has small uniform bubble size, is long lasting and has what may be regarded as a pleasing taste and mouth feel. The use of nitrogen in a mixture with carbon dioxide for dispensing purposes has hitherto mainly been restricted to the bulk dispensing of beverages from large volume containers (such as beer casks, kegs or barrels) and such dispensing is disclosed in our U.K. Patent No. 876,628. With bulk dispensing of a beverage containing nitrogen in solution it is essential that the beverage is subjected to excitation by which the gases in the beverage are liberated during draughting to assist in forming the head. This excitation can take many forms including a restrictor by which the beverage is subjected to cavitation to liberate the gas (for example as disclosed in our U.K. Patent No. 1,063,753) or ultrasonic vibration such as is disclosed in U.K. Patent No. 1,378,692. Because of the difficulties of liberating a gas such as nitrogen the use of this gas has generaly been restricted, as aforementioned, to bulk dispensing systems while beverages which are dispensed from small volume receptacles such as beer or soft drink cans, bottles or cartons contain a gas such as carbon dioxide, sufficient proportions of which are readily liberated to provide what may be considered to be appropriate characteristics for the dispensed product.

To the discerning palate and particularly for fermented liquors, beverages dispensed from a bulk system with mixed gases of carbon dioxide and nitrogen are considered to have greater appeal and better characteristics to the head than that beverage when dispensed from a can or bottle solely with a readily liberated gas such as carbon dioxide. For this reason considerable research has been made into the provision of a bottled or canned beverage containing nitrogen in solution so that the beverage when dispsned will have substantially the same characteristics as would be expected from that beverage when dispensed from a bulk system; a discussion of this development is disclosed in our German Offenlegungscrift No. 2,742,064. In this Offenlegungschrift there are disclosed several techniques by which the gas, particularly nitrogen, may be liberated to contribute to or form the head of froth on a beverage dispensed from a bottle or can. Although each of these techniques provides an acceptable product in the form of the beverage which is dispensed it is believed that a problem exists to improve the method and means by which the dispensing is effected and also the general presentation of such method and means, the solution of this problem is a primary object of the present invention.

Throughout the following description and claims the following definitions will apply:

by "container" is meant a relatively small volume receptacle which is capable of being shelf-stored to be readily available for retail sales; examples of containers are therefore bottles, cans and cartons which will usually have a capacity of up to five litres;

by "package" is meant a container as aforementioned containing a beverage having gas in solution and which beverage is to be dispensed from the container for consumption; therefore a "package" contains a relatively small volume of the beverage which is to be dispensed (as compared with large or bulk volume dispensing systems for beverages from kegs, casks, barrels or the like);

by the term "gas" is meant such a substance which is not harmful to a consumer, does not impair the normal taste of the beverage and does not adversely affect the physical and chemical characteristics which are required of the beverage; examples of appropriate gases are air, nitrogen, carbon dioxide or a mixture thereof.

According to the present invention there is provided apparatus for dispensing from a package (as herein defined) the beverage which comprises means for temporarily retaining the package with an outlet thereof in communication with an outlet passage through which the beverage is to be dispensed; means for injecting gas under pres-

sure into the package to displace the beverage from the container through the outlet and into the outlet passage, and excitation means associated with the outlet passage by which gas in solution in the beverage is caused to be liberated to form or contribute to the formation of a head of froth on the beverage when it is dispensed from the outlet passage.

Further according to the present invention there is provided a system for dispensing beverage containing gas in solution which comprises a package (as herein defined) from which the beverage is to be dispensed; an outlet passage through which the beverage is to be dispensed, said outlet passage communicating with an outlet of the container; means for injecting gas under pressure into the container to displace the beverage therefrom through the outlet and into the outlet passage, and excitation means communicating with the outlet passage, the beverage being displaced through the excitation means during its flow through the outlet passage and said means causing gas in solution to be liberated to form or contribute to a head of froth on the beverage when dispsned from the outlet passage.

Still further according to the present invention there is provided a method of dispensing from a package (as herein defined) the beverage, said beverage having gas in solution therewith, which comprises locating the beverage in communication with an outlet passage; passing gas under pressure into the pacakge to displace the beverage from the container and through the outlet passage and subjecting the beverage during its flow through said outlet passage to excitation by which gas in solution with the beverage is liberated to form or contribute to a head of froth on the beverage which is dispensed from the outlet passage.

From the aforegoing statements it will be seen that the invention affords the advantage whereby a beverage may readily be dispensed from a shelf stored package in a manner whereby during dispensing gas in solution in the beverage is liberated as a result of excitation to which the beverage is subjected so that such gas is available for forming a head which may have the previously described desirable characteristics (and which gas would not normally be liberated to form the head merely by subjecting the beverage to turbulence or by straight forward displacement of the beverage from the container by gas under pressure).

Since the invention concerns packages which are shelf stored for ready availability in retail sales it is preferred that the apparatus is in the form of a compact bar mountable unit. In such a unit there may be a relatively short run through the outlet passage from the outlet of the container and by way of the excitation means to a spout from which the beverage is dispensed. The excitation means is preferably in the form of a restrictor or perforated plate disposed in the outlet passage so that the beverage is subjected to cavitation in passing therethrough to liberate the gas in the beverage. Other forms of excitation means may be used such as subjecting the beverage to ultrasonic vibration during its flow through the outlet passage or by subjecting the beverage to an excitation surface during its flow through the outlet passage by which surface the beverage is exposed to nucleation sites capable of inducing foaming.

During dispensing of the beverage from its package, the outlet from the container through which the beverage flows into the outlet passage and also the aperture through which the beverage is subjected to gas pressure to be displaced from the container should form a sealed dispensing system to alleviate leakage of the gas and/or the beverage. With a bottled beverage the outlet and the aperture through which the gas is injected will be provided by the bottle mouth and preferably the outlet passage is extended in the form of a dip tube. This tube is inserted through the bottle mouth and into the beverage while the rim of the bottle mouth may be held against a seal which permits gas under pressure to be injected into the headspace of the bottle so displacing the beverage through the dip tube for dispensing. With cartons and cans however it is not essential that the outlet for the beverage and the aperture through which the gas is injected into the container are provided by a common opening in the container; for example, beverage can be displaced for dispensing from a can or carton by injecting gas into the headspace of the can or carton while an opening is provided, for example by piercing, in the bottom of the can or carton through which the beverage is displaced into the outlet passage.

With what may be regarded as a rigid or semi-rigid container, particularly a bottle or can, the dispensing apparatus may include a clamp device by which the container is held with its outlet (through which the beverage is displaced from the container) and/or the opening through which the gas is injected into the container in sealed relationship with the outlet passage and/or the gas inflow passage as the case may be. The clamp device conveniently comprises two opposed clamping units which are intended to engage the upper and lower portions of the container to hold it firmly during dispensing. These clamping units may be spring loaded towards each other to retain the container and openable to facilitate loading of a full container and removal of an empty container. With a bottle, the mouth thereof may be received within the upper clamping unit so that the rim of the mouth is held by the clamp device in engagement with an annular seal; in this position a

dip tube as aforementioned may extend through the seal and into the beverage in the bottle while gas is injected into the headspace of the bottle through the seal (externally of the dip tube) to cause the beverage to be displaced from the bottle upwardly through the dip tube. This arrangement may also be used with a can having a tear-off top portion where the dip tube can extend through the upper opening while the upper rim of the can is held against the seal. Alternatively, for a can, the lower clamping unit may have associated therewith means for piercing the can wall in or towards the bottom of the can so that the outlet thus formed communicates in sealed manner with the outlet passage while gas is injected into the headspace at the top of the can through a conventional opening for a tear-off can (or another appropriately formed opening as may be made by piercing the wall of the can in or towards the top thereof) which is in sealed communication with the source of gas pressure. By spring loading the clamping units towards each other to retain the bottle or can as aforementioned the biasing force of the spring can be arranged to provide the desirable effect that if the gas pressure within the container exceeds a predetermined value, such pressure will cause the clamping units to open sufficiently to break the seal on the container and permit release of the gas pressure, thereby alleviating bursting of the container.

The means for injecting gas under pressure into the package to displace the beverage from the container may comprise a re-chargeable or replaceable reservoir of gas under pressure (such as a small cylinder of carbon dioxide, nitrogen, air or a mixture thereof) with an appropriate valve for injecting the gas as required. Alternatively the aforementioned means may be in the form of a pump which is operated to provide a surce of air under pressure on demand, such pump being operated for example electrically or manually. In a preferred construction where a bar mounted unit is intended to be wholly self cotained the gas under pressure is derived from a manually operated pump having a variable volume air chamber such as a piston and cylinder, diaphragm or bellows pump relative displacement of the piston, diaphragm or bellows for which to vary the volume of the air chamber is effected by a lever. This lever conveniently simulates a conventional form of beer pump handle whereby as the lever is pulled to relatively displace the piston/cylinder diaphragm or bellows and thereby force air under pressure into the container for displacing the beverage through the outlet passage, the beverage is dispensed from what appears to be a conventional but now rarely seen draught beer pump. Conveniently the displacement of this "beer pump handle" serves to control operation of the aforementioned clamp device for example when the handle is initially displaced from a neutral condition the clamp device may be opened to receive a container and when the handle is further displaced the clamp device may be closed to retain the container while air under pressure is injected for dispensing purposes. Preferably the aforementioned initial and further movements of the handle from the neutral condition are in opposite senses of direction from that condition. As with a conventional piston/cylinder, diaphragm or bellows pump a non-return inlet valve may be provided through which the pump chamber is charged with air but which closes automatically during injection of the compressed air. Such a non-return valve may be omitted however so that upon expansion of the pump chamber (following injection of air to effect dispensing) the flow of air into the chamber is by way of the outlet passage and through the compartment of the now empty container; by use of this technique the air which is drawn through the outlet passage may serve to dry that passage while drops of beverage which may have lain in the outlet passage are carried along by the air current to be desposited in the container.

Normally a diaphragm or bellows pump will be spring loaded to bias the air chamber to an expanded condition and displacement of the aforementioned pump handle serves to displace the diaphragm or bellows against its spring loading through a direct linkage system. As an alternative to this movement of the handle may energise a biasing device such as a spring which then serves to displace the diaphragm or bellows—this latter arrangement may be convenient so that an operative can displace the handle to its maximum intended extent where it engages a retaining catch and following which the diaphragm is displaced at its own speed to effect dispensing, upon the diaphragm reaching the end of its stroke the catch may be released automatically to permit return of the handle to its neutral condition and thereby expansion of the air chamber in the pump to effect the drying operation as aforementioned as air is drawn into the pump through the outlet passage. The outlet passage may include a gas venting valve device by which when gas is displaced from the container (for example during initial dispensing of the beverage when gas in the outlet passage which precedes the beverage must be vented or when the container is empty but gas under pressure is still being injected into the container) such gas is vented at a position remote from the dispensing spout but when the beverage is dispensed the valve automatically directs the beverage to the dispensing spout by closing off its associated gas vent. Such a venting valve is conveniently in the form of a simple float valve in which the float is heavier than the gas (and the forces to which it is subjected by the gas flow) but is lighter than the beverage so that

during gas flow in the outlet passage the float closes communication between the container and the dispensing spout whilst opening communication between the container and a gas vent and during beverage flow through the outlet passage the float opens communication between the container and the dispensing spout whilst closing communication between the container and the gas vent. The use of such a vent valve should alleviate spurting of the beverage from the dispensing spout when the container is virtually empty.

The present invention was primarily developed as indicated previously for liberating nitrogen gas and carbon dioxide gas in solution with a fermented beverage, especially stout. With such a beverage for use with the present invention the package will generally be shelf stored in a sealed condition containing nitrogen which is present in the range 0.015 to 0.055 vols./vol (preferably 0.045 vols./vol) while the carbon dioxide is present in the range 0.8 to 1.8 vols./vol.

One embodiment of the present invention will now be described by way of example only with reference to the accompanying illustrative drawings in which:

Figure 1 is a front elevation of a bar mountable self contained dispensing unit constructed in accordance with the invention;

Figure 2 is a side elevation in part section and part diagrammatic of the unit shown in Fig. 1;

Figure 3 diagrammatically illustrates the rear elevation of part of the unit shown in Fig. 2; and

Figure 4 diagrammatically illustrates a vent valve which may be incorporated in the outlet passage of the unit shown in Fig. 1.

The apparatus illustrated is intended for use with a package formed by a conventionally shaped 33 centilitre volume bottle 1 containing stout having in solution nitrogen gas and carbon dioxide gas. The nitrogen gas content may be regarded as approximately 0.045 vols./vol while the carbon dioxide gas content will likely be present in the range 0.8 to 1.8 vols./vol. With this high proportion of nitrogen gas, the mere pouring of the stout from the bottle 1 into a glass is unlikely to cause the nitrogen gas to be liberated to form a desirable head (with the consequence that the stout so dispensed would have a lacklustre appearance and generally unacceptable characteristics).

The dispensing apparatus illustrated is a compact bar mountable unit having an upright plate 2 carrying rearwardly extending brackets 3, 4 and a clamp 5 by which the unit is intended to be secured to a bar shelf with the latter positioned between the bracket 4 and clamp 5.

Pivotally mounted at 6 on a bracket 7 which extends forwardly from the plate 2 is a cup shaped bottle clamping plate 8 within which the base of the bottle 1 is received. Opposing the clamping plate 8 and spaced above that plate is an anvil block 9 which is secured to the plate 2 and carries a downwardly extending frusto conical skirt 10 within which the upper neck portion and outlet or mouth 11 of the bottle are located and intended to be retained during dispensing. The skirt 10 is screw threadedly connected at 12 to the anvil block 9 to secure between these components an annular seal 13.

The bottle 1 is held by the clamping plate 8 so that the rim 14 of the bottle mouth abuts and forms a seal against the seal 13. To provide this sealing effect the clamping plate 8, and thereby the bottle 1, is spring biased upwardly. Extending from the plate 8 is a lever 15 which is pivotally connected through an S-shaped rod 16 to an arm 17*a* of a bell-crank lever 17 which extends through a slot 2*a* in the plate 2 and is pivotally mounted at 18. The other arm 17*b* of the lever 17 is coupled by a helical tension spring 19 to a base 20 which is secured relative to the plate 2. By this arrangement the spring 19 constantly biases the bell-crank lever 17 to pivot at 18 (in an anticlockwise direction in Fig. 2) and thereby biases the bottle clamping plate 8 upwardly by pivotal movement of that plate about the pivot 6 (in a clockwise direction in Fig. 2) through the rod 16. To load a full bottle 1 on to the bottle clamping plate 8 so that the mouth 11 can be engaged within the skirt 10 it is necessary to displace the plate 8 downwardly by pivotal movement thereof about its pivot 6 with consequential displacement of the linkages coupled to that plate 8 against the biasing effect of spring 19. This downward displacement of the clamping plate 8 and its associated linkages is illustrated in Fig. 2 in ghost form with the respective references for these linkages being shown dashed. Means by which the pivotal movement of the clamping plate 8 is controlled will be described hereinafter.

Extending through the block 9 is an outlet passage 21 having a tubular spigot 22 which projects through the annular seal 13. Mounted on the spigot 22 and forming an extension of the outlet passage is a flexible dip tube 23 which is received within the bottle 1 as the latter is loaded into the unit so that the bottom end of the dip tube is at the bottom of the bottle beneath the stout which is to be dispensed. The outlet passage 21 is partly formed by a tube 24 (Fig. 1) and terminates in a downwardly directed spout 25 formed by a nozzle 26 screw threadedly connected to the tube 24.

Stout is intended to be displaced from the bottle 1 by the admission of air under pressure into the headspace of the bottle (in a manner to be described later) so that the stout is dispensed upwardly through the dip tube 23 and the passage 21 to emerge from the

spout 25 into a drinking glass (not shown). To ensure efficient formation of a head of froth on the stout by release of the gas, especially nitrogen, from the stout the nozzle 26 carries excitation means in the form of a restrictor comprising a perforated disc (not shown) having a number of apertures of fixed size. This disc is removably mounted in the nozzle 26 and the stout prior to emerging from the spout 25 passes through the apertures in the disc whereby the stout is subjected to cavitation to effect liberation of the gas and produce a fine head on the dispensed stout. The perforated disc may have characteristics such as those described in our U.K. Patent No. 1,063,753.

The admission of air under pressure into the headspace of the bottle 1 as aforementioned is effected by a manually operated diaphragm pump 27 which comprises an annular housing 28 which is secured to and extends rearwardly of the plate 2. The flexible diaphragm 29 for the pump is carried by the housing 27 to form therewith and with the plate 2 the air chamber 30. The chamber 30 communicates with the annular aperture formed between the spigot 22 and seal 13 (and therethrough with the headspace in the bottle 1) by way of a passage 31 in the plate 2 and block 9. Displacement of the diaphragm 29 between its position (indicated at 29′) corresponding to expansion of the chamber 30 and its condition (shown at 29) corresponding to contraction of the chamber 30 is controlled by a manually operated lever or pump handle 32 which is mounted for rotation with a shaft 33 which is coaxial with the pivot 18. The shaft 33 (see Fig. 3) is rotatably mounted in supports 34 carried by the plate 2. Mounted on the shaft 33 is a sleeve 35 having a radially extending lever 36 which is rigid therewith and by which the sleeve is coupled through an articulated linkage 37 with the diaphragm 29. The sleeve 35 is coupled to the shaft 33 by a lost motion device 38 by which the sleeve can exhibit restricted rotation relative to the shaft 33. The device 38 is formed by a circumferentially extending recess 39 in the sleeve which cooperates with a radially extending pin 40 on the shaft 33.

By pulling the handle 32 to rotate the shaft 33 in an anticlockwise direction in Fig. 2 it will be seen that the pin 40 will abut the recess 39 causing the sleeve 35 to rotate with the shaft and thereby the lever 36 to be rocked in a sense which displaces the diaphragm from its expanded condition 29′ to its contracted condition 29 and air to be displaced from the chamber 30 and injected under pressure into the headspace of the bottle 1. The diaphragm 29 is biased (by spring means not shown or by its natural resilience) into its expanded condition 29′ so that following injection of air under pressure into the bottle the pump handle 32 may be released to return under the biasing effect of the diaphragm 29 through the sleeve and lost motion coupling 38. With the diaphragm in its expanded condition 29′ the pump handle 32 may be regarded as being in a neutral condition where it is conveniently upright. In this neutral condition of the handle 32 th pin 40 preferably abuts the wall of the recess 39 as indicated in Fig. 3 so that displacement of the lever anticlockwise in Fig. 2 will immediately commence compression of the air chamber 30. Desirably a single compression of the chamber 30 provides sufficient air under pressure to ensure that all of the stout contained in the bottle 1 will be displaced through the outlet passage and dispensed into the drinking glass. However, there is no reason why an operative cannot apply several pumping strokes to the lever 32 for dispensing rapidly from the bottle 1. Admission of air into the chamber 30 during expansion of the diaphragm 29 may be by way of a non-return valve (not shown) mounted in the housing 28. Alternatively such admission can be achieved by allowing the air to be drawn in through the spout 25 and by way of the passage 21, dip tube 23, the bottle chamber and the passage 31—this may be advantageous as the air flow through the outlet passage will provide a drying effect.

As previously mentioned the loading of a full bottle 1 on to the bottle clamping plate 8 (and also the removal of an empty bottle from the plate 8) is facilitated by displacement of the plate 8 to a lower position indicated at 8′ in Fig. 2 and this displacement is conveniently controlled by the pump handle 32. For this control the bell crank lever 17 is formed as a rigid extension of a sleeve 41 (Fig. 3) on the shaft 33. The sleeve 41 is coupled to the shaft 33 by a lost motion device 42 so that the sleeve 41 and bell crank lever are capable of restricted rotation relative to the shaft 33. The lost motion device 42 is formed by a circumferentially extending recess 43 in the sleeve 41 which cooperates with a radially extending pin 44 on the shaft 33. With the lever 32 in its neutral upstanding condition the pin 44 abuts an edge of the recess 43 as shown in Fig. 3, such abutment being effected by the biasing effect of spring 19 on the bell crank lever 17 and in this condition the bottle clamping plate 8 is located in its upward position as shown in Fig. 2 to bias the rim of the bottle mouth into sealing engagement with the seal 13. When the pump handle 32 is displaced anticlockwise in Fig. 2 as previously described for injecting air under pressure into the bottle 1 the spring 19 maintains its force on the bell crank lever so that the sleeve 41 may rotate with the shaft 33 by the recess 43 maintaining its abutment as shown on the pin 44 or alternatively the pin 44 may move circumferentially along the recess 43 but in either event a spring biasing

force is maintained on the bottle clamping plate 8 to urge the bottle rim into sealed engagement within the skirt 10. Desirably the spring 19 is selected so that if the air pressure within the bottle 1 exceeds what may be regarded as a safe valve, such pressure will cause the bottle rim to move away from the seal 13 (by pivotal movement of the plate 8 against the biasing effect of the spring 19) to release the air pressure and thereby alleviate the possibility of the bottle bursting.

To effect displacement of the clamping plate 8 into its lower position for bottle loading or removal the pump handle 32 is displaced from is neutral condition in a clockwise direction in Fig. 2; the consequential rotation of the shaft 33 and abutment of the pin 44 with the wall of the recess 43 causes the bell crank lever 17 to be pivoted in a clockwise direction in Fig. 2 to the position shown at 17' where the plate is lowered to the position 8'. During this lowering movement of the bottle clamping plate from its position 8 to 8' it will be seen that the pin 40 can move freely along the recess 39; thus the lowering and raising of the plate 8 (by sequential displacement of the pump handle 32 in Fig. 2 from its neutral condition in a clockwise direction and then in an anti-clockwise direction to return it to its neutral upright condition) prior to commencement of air injection does not cause displacement of the diaphragm 29.

During dispensing of stout from the bottle 1 and as the bottle empties, the lower end of the dip tube 23 will eventually be exposed above the surface of the stout. The effect of this is that a mixture of air and beer may be forced through the outlet passage to provide a spurting effect from the nozzle 26. To alleviate this the outlet passage may be provided with a vent valve which is conveniently located upstream of the excitation means in the pipe 24. A simple form of vent valve 45 in the pipe 24 is shown in Fig. 4 in which a valve chamber 46 has a side inlet port 47, a lower outlet port 48 and an upper vent port 49. Housed within the chamber 46 is a ball float 50 which is capable of closing either port 48 or port 49 (and normally closes the former). The float 50 has characteristics whereby it is heavier than air but considerably lighter than the liquid which is to be dispensed; consequently when air is displaced from the bottle through the passage 24 it enters the chamber 46 by way of port 47 and vents by way of port 49 while communication between ports 47 and 48 is closed by the float 50. Alternatively when beer is displaced from the bottle it enters chamber 46 through port 47 and the buoyancy of the float 50 causes the latter to rise and close off vent port 49 while opening communication between ports 47 and 48 for the beer to be dispensed through the nozzle 26. The vent port 49 conveniently communicates through a tube not shown with a drip tray 51 mounted on the panel 2 beneath the intended position for location of a drinking glass during dispensing.

With the unit mounted on a retail bar counter it is envisaged that the front of the unit (that is the side of the plate 2 on which the bottle is loaded) will be directed towards an operative while the other side of the plate 2 is likely to be presented to a customer. The diaphragm pump and linkage/lever system may therefore be provided with a cover 52 having an appropriate facia 53 for advertisement.

Although the aparatus, system and method of the present invention were primarily developed for dispensing fermented beverage, particularly beer or stout, it is to be realised that the invention is equally applicable to non-fermented beverages which contain gas (especially nitrogen) in solution and which it is desired to dispense in a manner whereby the gas can be liberated to form or contribute to the formation of a head of froth on the beverage as dispensed.

CLAIMS

1. Apparatus for dispensing from a package (as herein defined) the beverage which comprises means for temporarily retaining the package with an outlet thereof in communication with an outlet passage through which the beverage is to be dispensed; means for injecting gas under pressure into the package to displace the beverage from the container through the outlet and into the outlet passage, and excitation means associated with the outlet passage by which gas in solution in the beverage is caused to be liberated to form or contribute to the formation of a head of froth on the beverage when it is dispensed from the outlet passage.

2. Apparatus as claimed in claim 1 in which the excitation means comprises a restrictor in the outlet passage.

3. Apparatus as claimed in claim 2 in which the restrictor comprises a perforated plate through the holes in which the beverage flows to be subjected to cavitation for liberation of gas in the beverage.

4. Apparatus as claimed in any one of the preceding claims in which the outlet passage is extended by a dip tube which is intended to be inserted into the beverage in the container, and wherein means is provided for injecting gas under pressure into the headspace of the package to cause the beverage to be dispensed through the outlet passage by way of the dip tube.

5. Apparatus as claimed in claim 4 in which injection of gas under pressure into the headspace and location of the dip tube into the beverage is to be by way of a common opening in the container and wherein sealing means is provided with which the container is intended to form a seal so that the gas

injection into the headspace is through a sealed connection.

6. Apparatus as claimed in any one of claims 1 to 3 in which means is provided for injecting gas under pressure into the headspace of the package and the outlet passage is intended to communicate with the beverage in the package through a bottom wall part of the container.

7. Apparatus as claimed in claim 6 in which the outlet passage has associated therewith means for piercing the bottom wall part of the container to provide comunication between the beverage and the outlet passage.

8. Apparatus as claimed in any one of the preceding claims and comprising a clamp device by which the container is intended to be held during the dispensing of beverage from the package.

9. Apparatus as claimed in claim 8 in which the clamp device includes sealing means so that the container when held by the device will receive the gas injection through a sealed connection.

10. Apparatus as claimed in either claim 8 or claim 9 when appendant to claim 6 in which the clamp device includes sealing means or further sealing means so that the container when held by the device will communicate with the outlet passage through a sealed connection.

11. Apparatus as claimed in any one of claims 8 to 10 in which the clamp device comprises two opposed clamping units which are intended to engage the upper and lower portions of the container.

12. Apparatus as claimed in claim 11 in which the upper clamping unit is intended to receive the upper portion of the container and to form a seal with a rim on that portion.

13. Apparatus as claimed in claim 12 in which the upper camping unit comprises a skirt within which the upper portion of the container is to be received for locating the rim of the container in engagement with sealing means located within the skirt.

14. Apparatus as claimed in any one of claims 11 to 13 in which the lower clamping unit is in the form of a cup in which the lower portion of the container is received.

15. Apparatus as claimed in any one of claims 11 to 14 when appendant to claim 7 in which the lower clamping unit carries the means for piercing the bottom wall part of the container.

16. Apparatus as claimed in any one of claims 11 to 15 in which the opposed clamping units are displaceable relatively away from each other to be openable for facilitating loading of the package prior to dispensing and for facilitating removal of an empty container.

17. Apparatus as claimed in claim 16 in which the upper clamping unit is fixed and the lower clamping unit is displaceable relative thereto.

18. Apparatus as claimed in any one of claims 11 to 17 in which the clamping units are spring biased towards each other.

19. Apparatus as claimed in either claim 16 or claim 17 or in claim 18 when appendant thereto in which lever means is provided by which relative movement between the clamping units is controlled.

20. Apparatus as claimed in any one of the preceding claims in which the means for injecting gas under pressure comprises a rechargeable or replaceable reservoir of the gas under pressure and valve means for controlling injection of the gas into the package.

21. Apparatus as claimed in any one of claims 1 to 19 in which the means for injecting gas under pressure comprises a pump which is operated to provide a source of air under pressure on demand.

22. Apparatus as claimed in claim 21 in which the pump comprises a variable volume air chamber which is expansible and contractible by manual operation such as a piston and cylinder, diaphragm or bellows pump.

23. Apparatus as claimed in claim 22 in which operation of the pump is effected by lever means or further lever means which is coupled to vary the volume of the air chamber.

24. Apparatus as claimed in claim 23 when appendant to claim 19 in which the lever means controlling relative movement of the clamping units and the further lever means effecting operation of the pump are adjustable by a displaceable handle which is common to both said lever means.

25. Apparatus as claimed in claim 24 in which the displaceable handle has a neutral condition and displacement of that handle from said condition provides two separate functions, firstly the function of the clamping units being opened and closed to facilitate loading of a package or unloading of an empty container and secondly the function of operating the pump.

26. Apparatus as claimed in claim 25 in which said first function is effected by initial movement of the handle from its neutral condition and the second function is effected by further movement of the handle from its neutral condition.

27. Apparatus as claimed in claim 25 in which said first function is effected by movement of the handle in one sense of direction from its neutral condition and the second function is effected by movement of the handle in the opposite sense of direction from its neutral condition.

28. Apparatus as claimed in claim 27 in which displacement of the handle to one side of its neutral condition and back to the neutral condition sequentially opens and closes the clamping units and displacement of the handle to the opposite side of its neutral condition operates the pump.

29. Apparatus as claimed in any one of claims 24 to 28 wherein the displaceable handle is coupled to operate the lever means and the further lever means through lost motion devices, said devices permitting relative movement between the clamping units to be effected without operation of the pump and operation of the pump to be effected without imparting relative opening movement to the clamping units.

30. Apparatus as claimed in any one of claims 24 to 29 in which the displaceable handle is pivotally mounted for rotation with a shaft, said shaft being coupled to the lever means and further lever means so that each said lever means is controlled by rotation of the shaft from the handle.

31. Apparatus as claimed in claim 22 or in any one of claims 23 to 30 when appendant thereto in which a non-return valve is provided through which air is drawn into the air chamber of the pump during expansion of that chamber.

32. Apparatus as claimed in nay one of the preceding claims in which the outlet passage includes a gas venting valve device by which when gas is displaced from the container said gas is directed to a vent remote from an outlet spout of the outlet passage and when the beverage is dispensed from the container said valve directs the beverage to the spout and closes the vent to communication with the beverage.

33. Apparatus as claimed in claim 32 in which the venting valve device comprises a float valve the float of which is heavier than the gas but which is buoyant in the beverage so that during gas flow in the outlet passage the float will close off communication between the container and the spout whilst opening communication between the container and the vent and during beverage flow through the outlet passage the float will open communication between the container and the spout whilst closing communication between the container and the vent.

34. A self contained dispensing unit substantially as herein described with reference to the accompanying illustrative drawings.

35. A system for dispensing beverage containing gas in solution which comprises a package (as herein defined) from which the beverage is to be dispensed; an outlet passage through which the beverage is to be dispensed, said outlet passage communicating with an outlet of the container; means for injecting gas under pressure into the container to displace the beverage therefrom through the outlet and into the outlet passage, and excitation means communicating with the outlet passage, the beverage being displaced through the excitation means during its flow through the outlet passage and said means causing gas in solution to be liberated to form or contribute to a head of froth on the beverage when dispensed from the outlet passage.

36. A system as claimed in claim 35 in which the package contains a nitrogenated beverage.

37. A system as claimed in claim 36 in which the beverage in the container has in solution therewith nitrogen gas and carbon dioxide gas, the nitrogen gas being present in the range 0.015 to 0.055 vols./vol and the carbon dioxide gas being present in the range 0.8 to 1.8 vols./vol.

38. A system as claimed in any one of claims 35 to 37 in which the means for injecting gas under pressure into the container injects said gas into the headspace of the container to effect displacement of the beverage into the outlet passage.

39. A system as claimed in claim 38 in which the outlet passage comprises a dip tube which extends through said headspace into the beverage and through which dip tube the beverage is displaced from the container into the outlet passage.

40. A system as claimed in claim 38 in which the outlet from the container is positioned remotely from the headspace and below the level of beverage in the container.

41. A system as claimed in any one of claims 35 to 40 in which the container is of a rigid or semi-rigid structure and is secured between opposed clamping units, one of said units comprising means through which gas is injected into the container.

42. A system as claimed in claim 41 in which the opposed clamping units are spring biased towards each other into clamping effect on the container.

43. A system as claimed in claim 42 in which said spring biasing urges the container into sealed relationship with the said one clamping unit for gas injection into the container and is arranged so that when gas pressure within the container exceeds a predetermined safe value the clamping units are displaced by said gas pressure and against the spring loading to break the sealed relationship and release the pressure.

44. A system as claimed in any one of claims 41 to 43 in which said one or the other of the clamping units comprises means by which the outlet of the container communicates with the outlet passage.

45. A system as claimed in any one of claims 35 to 44 in which the means for injecting gas under pressure comprises a manually operable air pump having an expansible and contractible air chamber and the gas injection is effected by contraction of the pressure chamber.

46. A system as claimed in claim 45 in which air is drawn into the pressure chamber during expansion thereof by way of a non-return valve associated with the pump.

47. A system as claimed in claim 45 in which air is drawn into the pressure chamber

during expansion thereof by way of the outlet passage to provide a drying effect in that passage.

48. A system as claimed in claim 41 or in any one of claims 42 to 47 when appendant thereto in which the opposed clamping units are displaceable relatively towards and away from each other to facilitate loading and removal of the container, said displacement of the clamping units being effected manually.

49. A system as claimed in claim 48 in which means is provided whereby when the opposed clamping units are disposed away from each other in an open condition to facilitate loading or removal of the container the gas injecting means is maintained inoperable and the gas injecting means is rendered operable upon the opposed clamping units being disposed towards each other to provide a clamping effect on the container.

50. A system as claimed in any one of claims 35 to 49 in which the excitation means is located within the outlet passage and the beverage is displaced therethrough to be subjected to cavitation which effects liberation of the gas.

51. A system as claimed in claim 35 and substantially as herein described.

52. A method of dispensing from a package (as herein defined) the beverage, said beverage having gas in solution therewith, which comprises locating the beverage in communication with an outlet passage; passing gas under pressure into the package to displace the beverage from the container and through the outlet passage and subjecting the beverage during its flow through said outlet passage to excitation by which gas in solution with the beverage is liberated to form or contribute to a head of froth on the beverage which is dispensed from the outlet passage.

53. A method as claimed in claim 52 in which the beverage in the package has in solution therewith nitrogen gas and carbon dioxide gas, the nitrogen gas being present in the range 0.015 vols./vol to 0.055 vols./vol and the carbon dioxide being present in the range 0.8 to 1.8 vols./vol.

54. A method as claimed in claim 53 in which the nitrogen gas content is substantially 0.045 vols/vol.

55. A method as claimed in any of claims 52 to 54 in which the beverage is fermented and comprises a beer, ale, lager or stout.

56. A method as claimed in claim 52 and subtantially as herein described.

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